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***DEFENSE THREAT REDUCTION  
AGENCY  
Consequence Assessment Branch  
Meteorology Program***

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# **OUTLINE**

- HPAC
- CLIMATOLOGY
- REQUIREMENTS
  - USER CONOPS ISSUES
  - METEOROLOGY ISSUES
- CONTACT INFORMATION

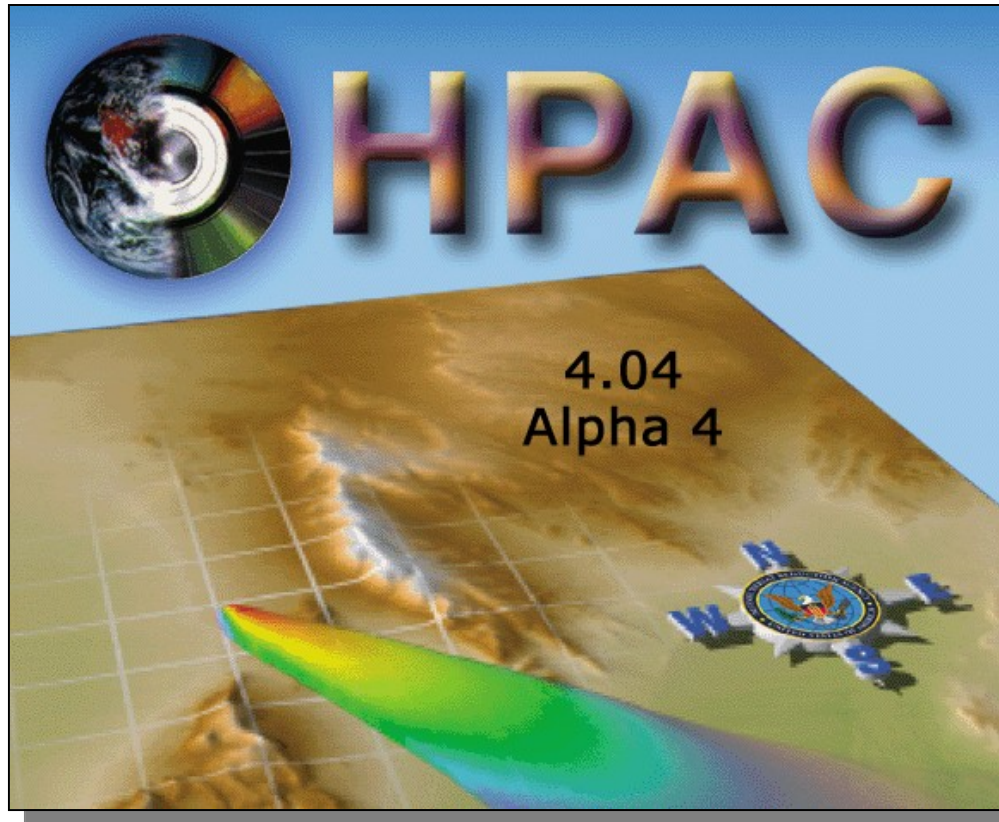


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# Hazard Prediction and Assessment Capability

Forward-deployable, counterproliferation-counterforce consequence assessment tool

- Predicts the effects of hazardous material releases into the atmosphere and its collateral impacts upon civilian and military populations
- Employs integrated source terms, **high resolution weather forecasts and observations**, and particulate transport algorithms



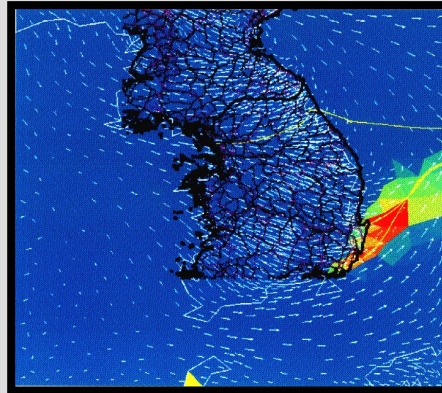
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# Hazard Prediction and Assessment Capability

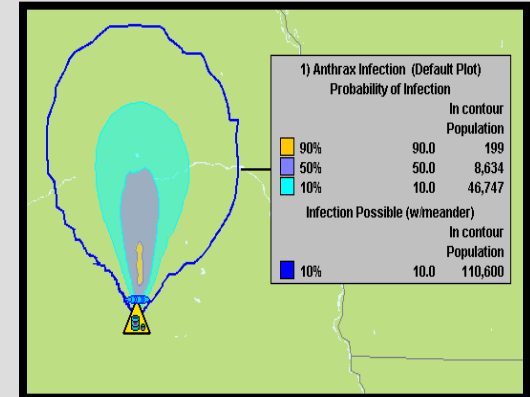
## Hazard Sources



## Weather & Transport



## Effects



- Chem/Bio Facilities
- Chem/Bio Weapons
- Radiological Weapons
- Nuclear Weapons
- Nuclear Facilities
- Nuclear Weapon Incident
- Missile Intercept

## • Historical Weather

## • Current Observations

## • Forecast Weather

- Human Medical Effects
- Toxicity Levels
- Contaminated Areas
- Population Exposure
- Casualties
- Hazard Areas



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## Incident Definition

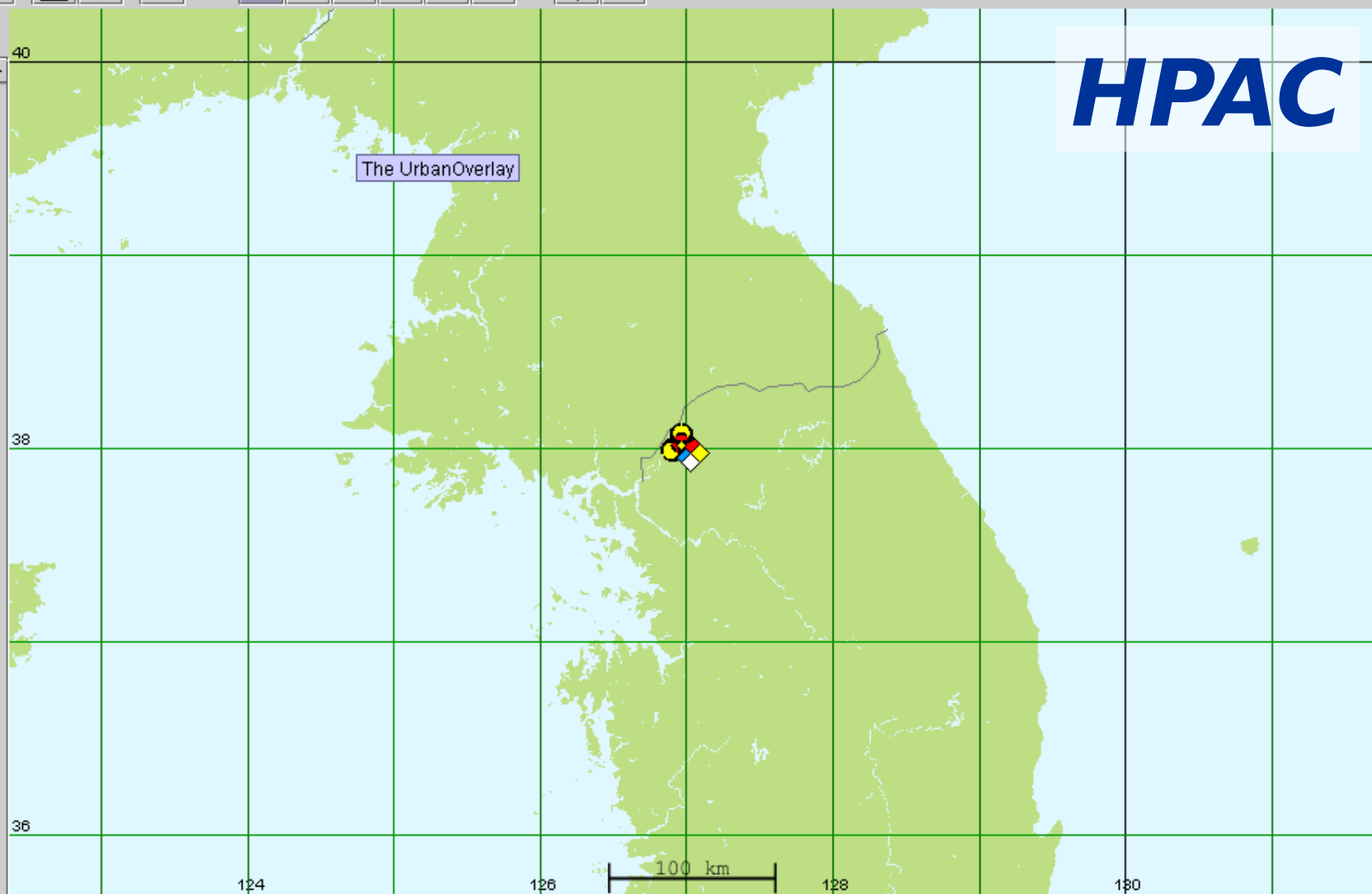
## WMD Usage



## NBC Releases



## Other



Weather



Urban



CBW/PN



Output





## Incident Definition

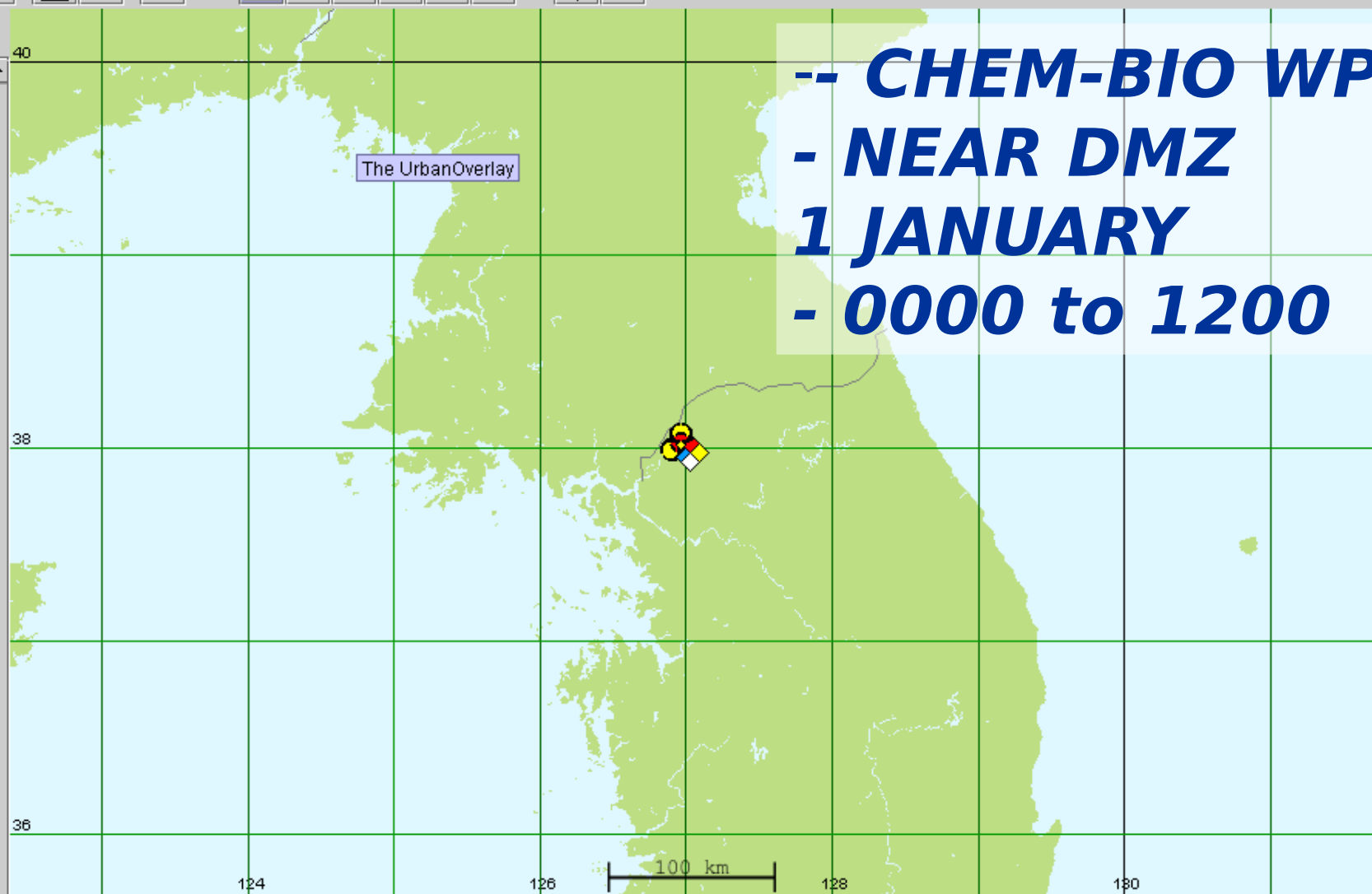
## WMD Usage



## NBC Releases



## Other



Weather



Urban



CBWPN



Output







## Incident Definition

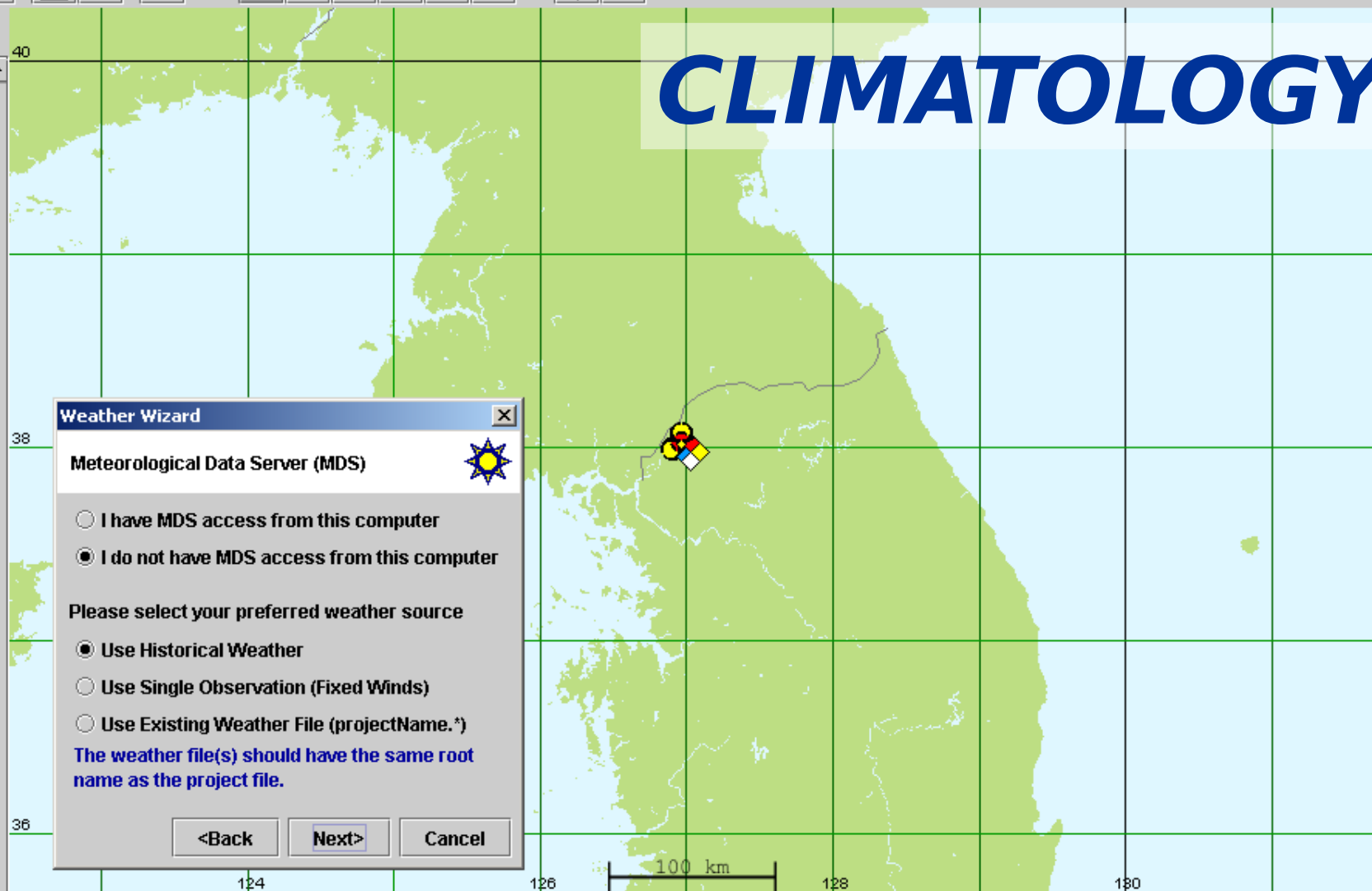
## WMD Usage



## NBC Releases



## Other



## Weather Wizard

## Meteorological Data Server (MDS)

- ☐ I have MDS access from this computer  
☒ I do not have MDS access from this computer

Please select your preferred weather source

- ☒ Use Historical Weather  
☐ Use Single Observation (Fixed Winds)  
☐ Use Existing Weather File (projectName.\*)

The weather file(s) should have the same root name as the project file.

&lt;Back

Next&gt;

Cancel

Weather



Urban

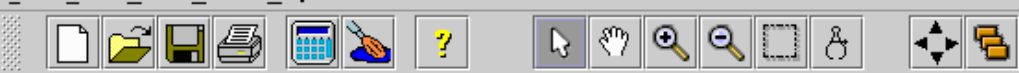


CBWPN



Output





Incident Definition

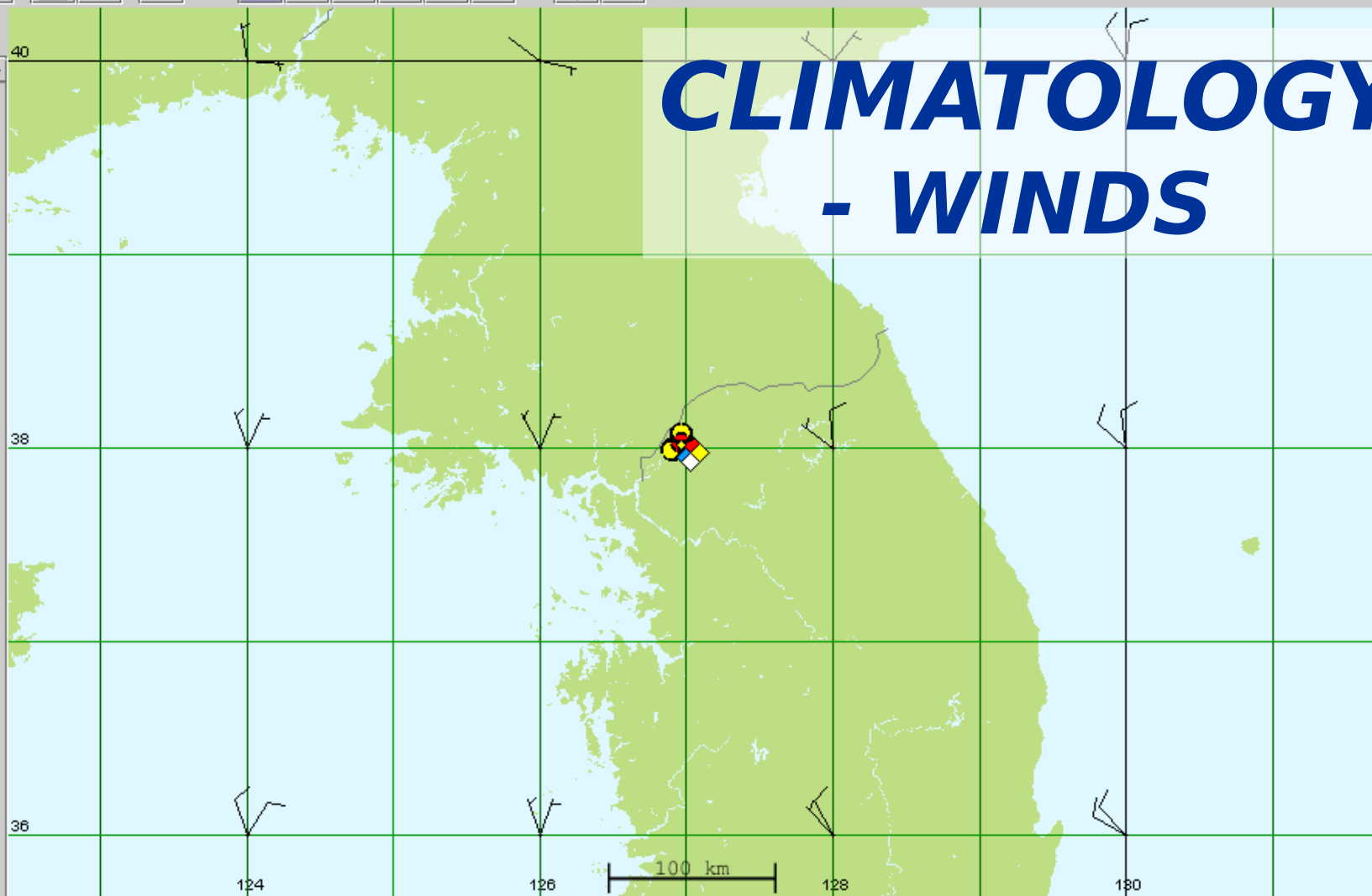
WMD Usage



NBC Releases



Other

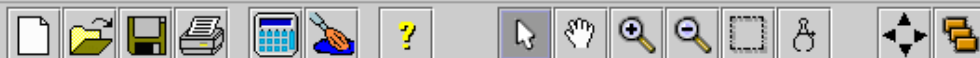


# CLIMATOLOGY - WINDS





File Edit Run View Help



## Incident Definition

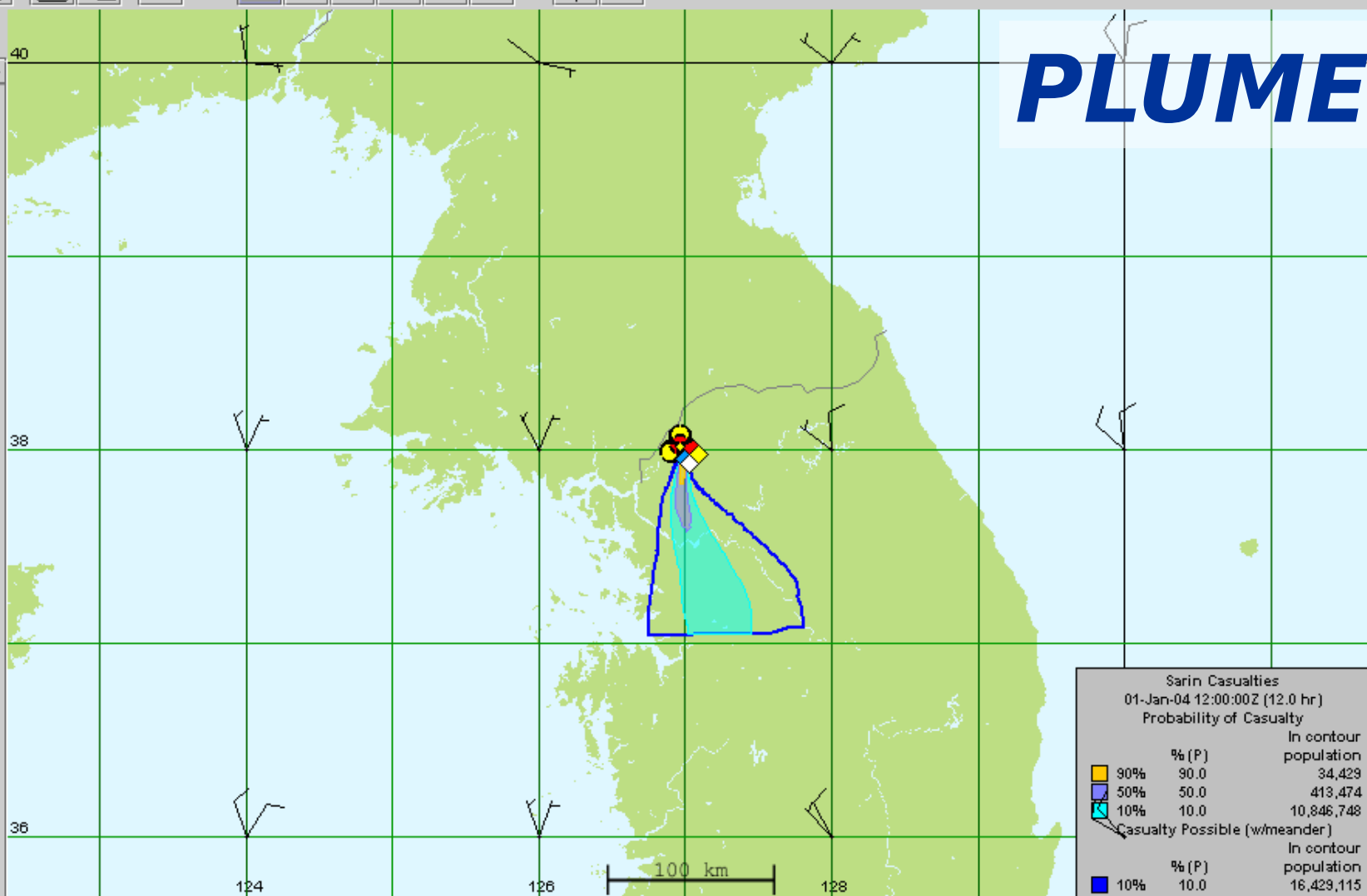
## WMD Usage



## NBC Releases



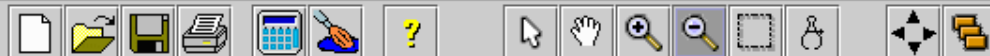
## Other



Object added

Map Scale: 5924102.5

40.26190N, 129.22592E



## Incident Definition

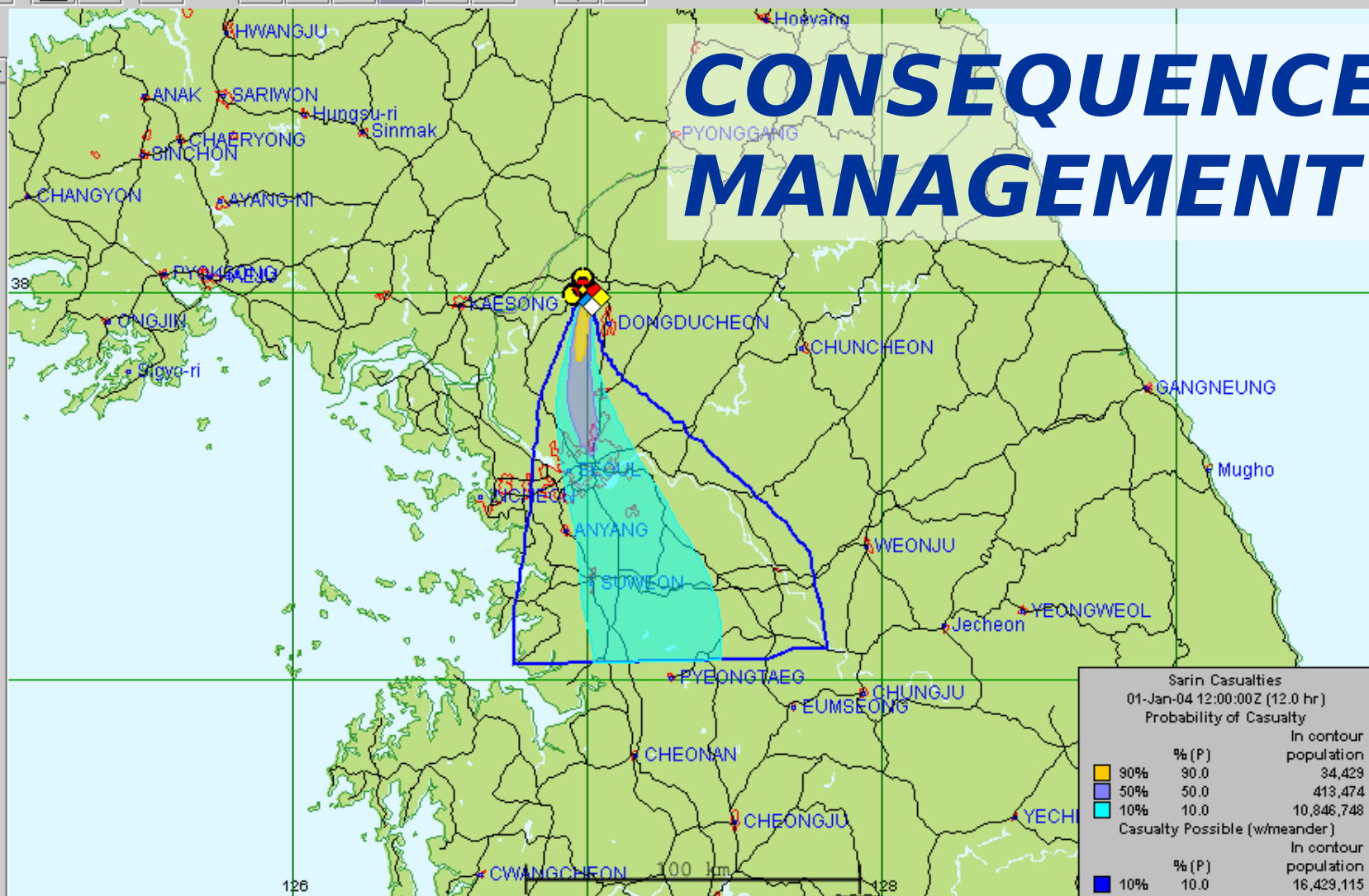
## WMD Usage



## NBC Releases



## Other



# CONSEQUENCE MANAGEMENT

| Sarin Casualties              |       |            |            |
|-------------------------------|-------|------------|------------|
| 01-Jan-04 12:00:00Z (12.0 hr) |       |            |            |
| Probability of Casualty       |       |            |            |
|                               | % (P) | In contour | population |
| 90%                           | 90.0  |            | 34,429     |
| 50%                           | 50.0  |            | 413,474    |
| 10%                           | 10.0  |            | 10,846,748 |
| Casualty Possible (w/meander) |       |            |            |
|                               | % (P) | In contour | population |
| 10%                           | 10.0  |            | 16,429,115 |



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# ***CLIMATOLOGY***

# CLIMO DATA FILE HEADER

| Parameter | Description                                                              |
|-----------|--------------------------------------------------------------------------|
| swlat     | 30 degree sector southwest corner latitude (deg)                         |
| swlon     | 30 degree sector southwest corner longitude (deg)                        |
| dlat      | Latitude resolution in degrees (deg)                                     |
| dlon      | Longitude resolution in degrees (deg)                                    |
| dt        | Temporal resolution in tenths of an hour (hours)                         |
| nvar      | Number of variables contained in the data records of each vertical level |
| nx        | Number of grid points in the x direction                                 |
| ny        | Number of grid points in the y direction                                 |
| nz        | Number of grid points in the z direction                                 |
| misflag   | Missing data flag (-999)                                                 |
| scalfact  | Scale factor for each of the data record variables                       |
| Pcoef     | Sigma pressure level coefficients                                        |



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# CLIMO DATA FILE HEADER

| Parameter      | Description                                          |
|----------------|------------------------------------------------------|
| Lat            | Latitude (deg)                                       |
| Lon            | Longitude (deg)                                      |
| ZT             | Terrain height corresponding to each grid point (Dm) |
| P <sub>s</sub> | Pressure at the surface layer (mb)                   |
| SHF            | Surface sensible heat flux (w/m <sup>2</sup> )       |
| Zi             | Mixing layer height calculated from TKE (m)          |
| TC             | Total cloud cover, all levels combined (%)           |
| Prec           | Precipitation over the 6-hour interval (mm/hr)       |
| mth            | Month over which data is summarized (1-12)           |
| t              | UTC                                                  |

# ***ANALYSIS DATA FILE***

| <b>Parameter</b> | <b>Description</b>                                      |
|------------------|---------------------------------------------------------|
| WDIR             | Wind direction for lat, lon, month, time of 1990 (deg)  |
| WSPS             | Wind speed for lat, lon, month, time of 1990 (m/s)      |
| T                | Temperature for lat, lon, month, time of 1990 (° C)     |
| RH               | Relative Humidity for lat, lon, month, time of 1990 (%) |



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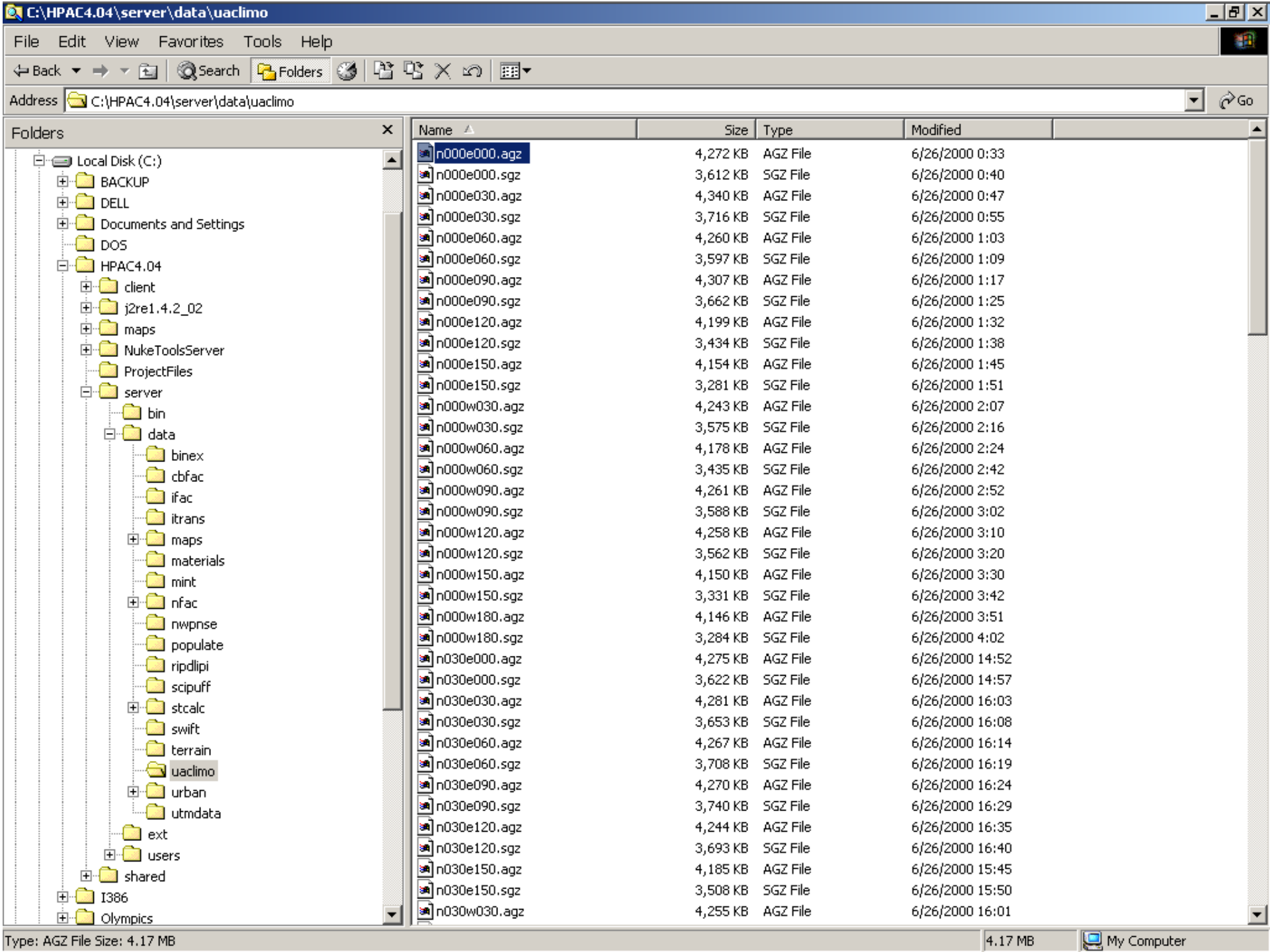
# SUMMARY DATA FILE

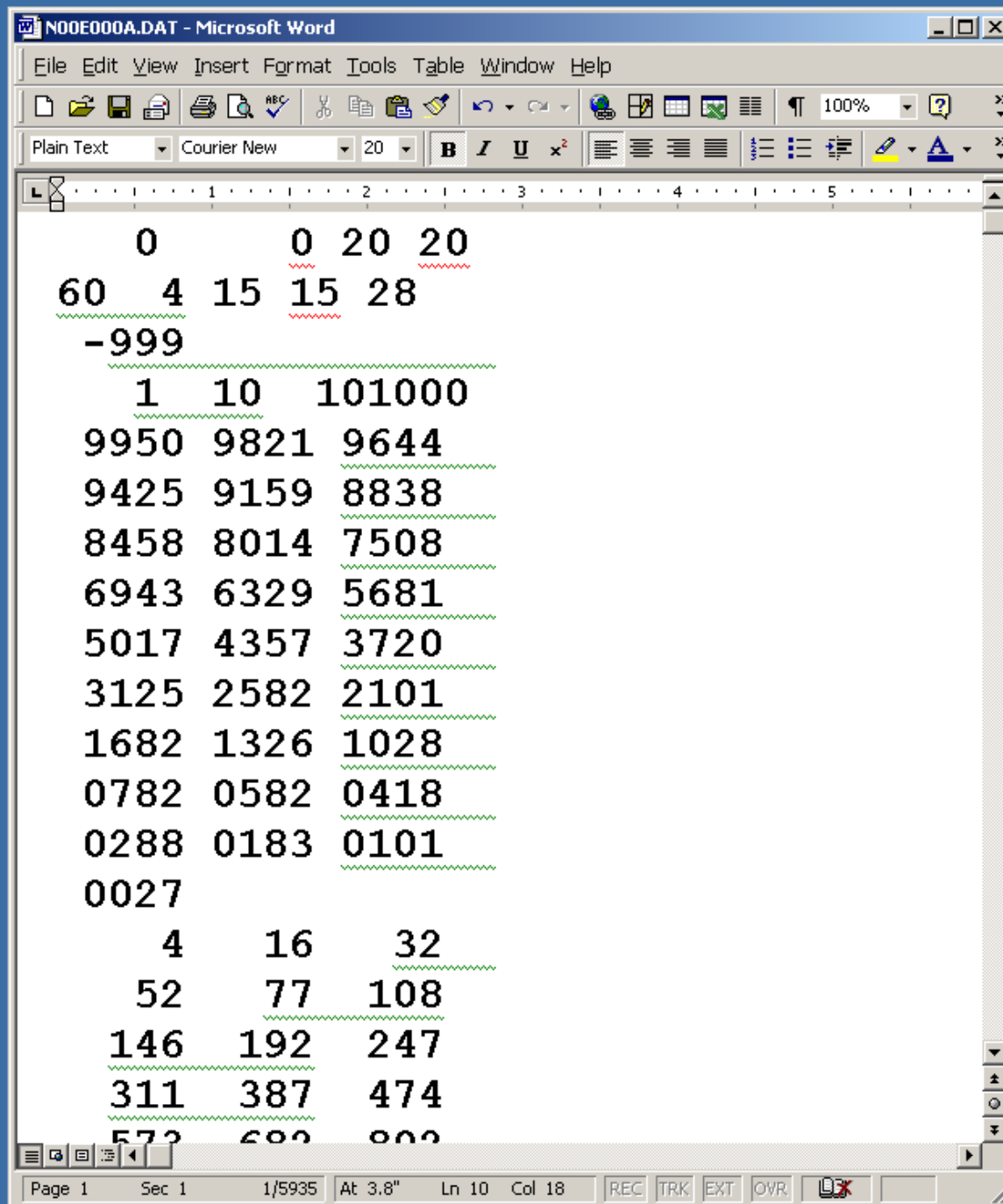
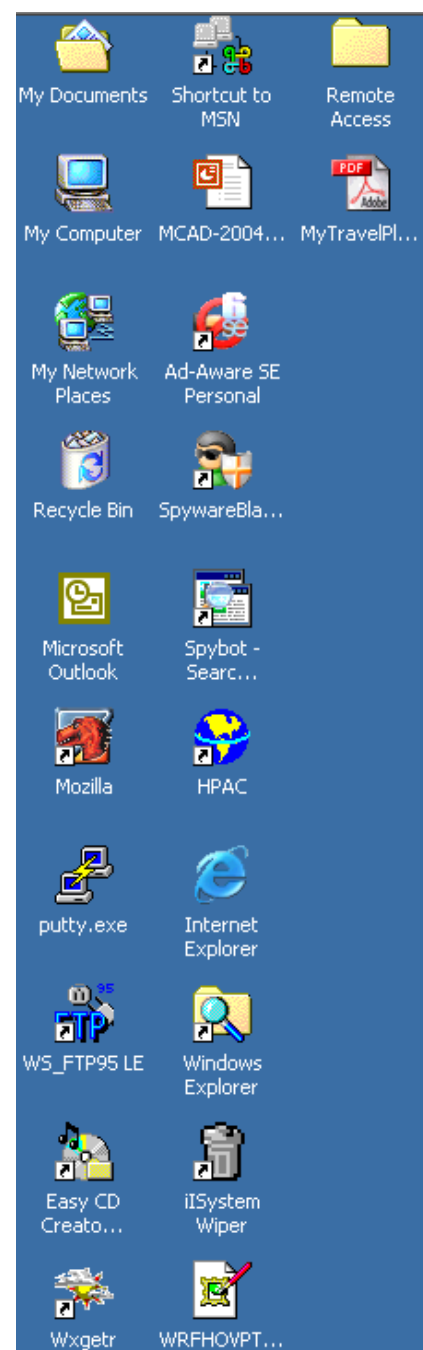
| Parameter  | Description                                                            |
|------------|------------------------------------------------------------------------|
| $\mu_u$    | Mean u wind component for month, time, location (m/s)                  |
| $\sigma_y$ | Standard deviation of u wind component for month, time, location (m/s) |
| $\mu_v$    | Mean v wind component for month, time, location (m/s)                  |
| $\sigma_v$ | Standard deviation of v wind component for month, time, location (m/s) |
| $R_{u,v}$  | Correlation coefficient between u and v                                |
| $T_{avg}$  | Average temperature for month, time, location ( $^{\circ}$ C)          |
| $RH_{avg}$ | Average relative humidity for month, time, location (%)                |



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# ***REQUIREMENTS***

# ***USER CONOPS ISSUES***

- ***SEVERAL OPERATIONAL SITUATIONS***
  - REACHBACK FROM OPERATIONS CENTER
    - ROBUST CONNECTIVITY
  - FORWARD OPERATIONS
    - MARGINAL CONNECTIVITY
- ***IMPLICATIONS FOR WEATHER DATA***
  - SOMETIMES ABLE TO DOWNLOAD BIG FILES
    - CAN USE HIGH-RESOLUTION WEATHER DATA
  - SOMETIMES LIMITED TO SMALL / NO DOWNLOADS
    - HAVE TO USE SMALL DATA FILES



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# ***METEOROLOGY ISSUES***

- ***SCALE OF INCIDENTS***

- TIME: VARIABILITY IN LESS THAN AN HOUR
- SPACE: VARIABILITY IN LESS THAN A KM

- ***IMPLICATIONS FOR WEATHER DATA***

- NEED WEATHER DATA ON SUB-HOURLY SCALE
- NEED WEATHER DATA ON SUB-KM SCALE



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# ***RESULTING DATA ISSUES***

***1. USERS OFTEN CANNOT HANDLE  
LARGE WEATHER DATA FILES***

***2. USEFUL WEATHER DATA IS HIGH  
TEMPORAL AND SPATIAL  
RESOLUTION; VERY LARGE FILE SIZE***



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***QUESTIONS???***

# ***CONTACT INFORMATION***

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